

ROBUST (Rotorcraft Blade Universal Shape Transformation) System for Controlled Aerodynamic Warping, Phase I

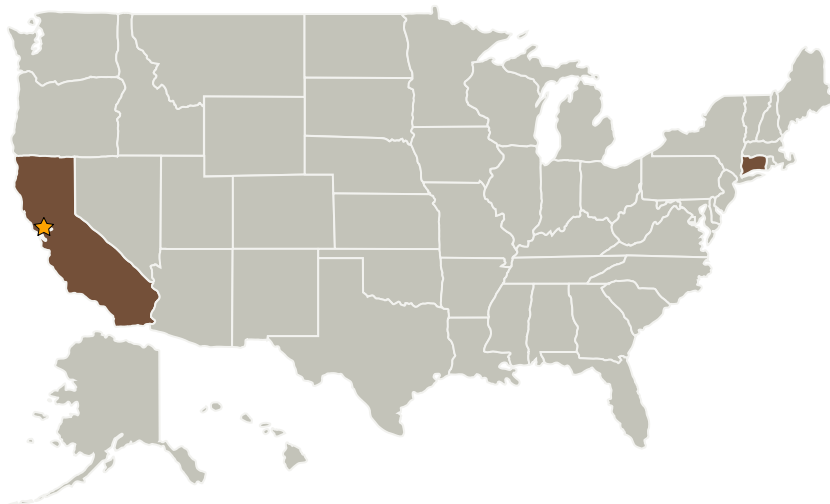
Completed Technology Project (2009 - 2009)



Project Introduction

In rotorcraft flight dynamics, optimized warping camber/twist change is a potentially enabling technology for improved overall rotorcraft performance. Recent research efforts have led to the application of active materials for rotorcraft blade actuation to dynamically change the blade camber/twist. However, full-scale aircraft application of these systems in demanding rotor blade environments gets significantly degraded by dynamic operational factors including friction, free play, and, aerodynamic and inertial loads. In a radical departure from current techniques, MTC proposes an innovative three-dimensional concept wherein typically closed section blade is cut open to create a torsionally compliant mechanism that acts as its own amplification device; blade deformation is dynamically driven by out-of-plane warping. During Phase I, this concept will be analyzed under dynamic operational factors. Required analytical and finite element tools will be developed within the framework of multibody dynamics that enable comprehensive aeroelastic evaluation of the concept. Feasibility of the concept for (i) swashplateless rotor system and (ii) higher harmonic control will be investigated and first-order actuator and blade cross-sectional design requirements will be established. Applications include both rotorcraft and fixed wing aircraft in the government and commercial sectors.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Materials Technologies Corporation	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Monroe, Connecticut

Primary U.S. Work Locations

California	Connecticut
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.6 Advanced Atmospheric Flight Vehicles